What is claimed is:

1. A method for controlling a boiler having a primary heat exchanger, the primary heat exchanger adapted to receive an incoming fluid stream, heat the incoming fluid steam, and provide an outgoing heated fluid steam to a heat load, the primary heat exchanger further having a minimum temperature threshold for the incoming fluid stream, the method comprising:

controlling the heat output of the boiler to meet the heat load; and

increasing the heat output of the boiler beyond what is required to meet the heat load and provide at least some of the heated water to the incoming fluid steam if the temperature of the incoming fluid steam would otherwise fall below the minimum temperature threshold of the primary heat exchanger.

2. A method for controlling a boiler having a primary heat exchanger, the primary heat exchanger adapted to receive an incoming fluid steam, heat the incoming fluid steam, and provide a heated output fluid stream to a heat load, the boiler further including a bypass flow path with a bypass valve for selectively providing some of the heated output fluid stream back to the incoming fluid stream, the primary heat exchanger further having a minimum temperature threshold for the incoming fluid, the method comprising:

controlling the boiler to meet the heat load;

controlling the bypass valve in an attempt to maintain the temperature of the incoming fluid stream above the minimum temperature threshold of the primary heat exchanger; and

overriding the boiler controlling step and/or the bypass valve controlling step to increase the temperature of the incoming fluid stream if the boiler controlling step and/or the bypass valve controlling step cannot maintain the temperature of the incoming fluid stream above the minimum temperature threshold of the primary heat exchanger.

3. A method according to claim 2 wherein the overriding step is faster acting than the boiler controlling step.

4. A method according to claim 2 wherein the overriding step is faster acting than the bypass valve controlling step.

5. A method for controlling a boiler having a primary heat exchanger and a firing rate, the primary heat exchanger adapted to receive an incoming fluid steam, heat the incoming fluid steam, and provide a heated output fluid stream to a heat load, the firing rate normally being adjusted to meet the heat load, the boiler further including a bypass flow path with a bypass valve for selectively providing some of the heated output fluid stream back to the incoming fluid stream, the primary heat exchanger further having a minimum temperature threshold for the incoming fluid stream, the method comprising:

detecting the temperature of the incoming fluid stream;

controlling the bypass valve in an attempt to maintain the temperature of the incoming fluid stream above the minimum temperature threshold of the primary heat exchanger;

controlling the firing rate to meet the heat load; and

increasing the firing rate if the bypass valve controlling step cannot maintain the temperature of the incoming fluid stream above the minimum temperature threshold of the primary heat exchanger.

6. A method according to claim 5 wherein the firing rate control step is controlled at a first control rate, and the firing rate increasing step is controlled at a second control rate, wherein the second control rate is faster than the first control rate.

7. A method for controlling a boiler having a primary heat exchanger with a condensation temperature, and a bypass valve, the method comprising:

monitoring a bypass temperature for circulating fluid entering the primary heat exchanger;

operating a first control method for the bypass temperature wherein the first control method calls for an increase in bypass temperature by sending a valve signal to open or close the bypass valve;

operating a second control method to determine whether an increase in bypass temperature is needed, wherein, if the second control method determines an increase in bypass temperature is needed, the second control method calls for an increase in firing rate regardless whether the bypass valve is 100% open.

8. The method of claim 7 wherein, for the first control method:

the valve signal is accumulated;

the accumulation of the valve signal can reach and exceed a 100% level where the bypass valve is fully open; and

after the accumulation of the valve signal exceeds the 100% level, the first control method is adapted to call for an increase in boiler firing rate to increase bypass temperature.

9. The method of claim 8 wherein first control method is adapted to call for an increase in boiler firing rate after the valve signal exceeds the 100% level by a threshold amount.

10. The method of claim 8 wherein first control method is adapted to call for an increase in boiler firing rate when the valve signal exceeds the 100% level for a certain amount of time.

11. The method of claim 7 wherein, for the first control method:

the valve signal is accumulated;

the accumulation of the valve signal can reach and exceed a 100% level where the bypass valve is fully open; and

when the accumulation of the valve signal exceeds the 100% level, the first control method calls for an increase in boiler firing rate to increase bypass temperature.

12. A controller for a boiler system having a memory containing an executable instruction set for performing the methods of claim 7.

13. A method of boiler control for a boiler having a circulating fluid inlet, a circulating fluid outlet, and a primary heat exchanger at which heat is added to the circulating fluid, the boiler being controlled at a firing rate, comprising:

observing a fluid temperature for a circulating fluid used in association with the boiler; and,

generating a first error signal for the purpose of limiting undesirably cool circulating fluid entering the primary heat exchanger;

generating a second error signal for the purpose of limiting undesirably cool circulating fluid from entering the primary heat exchanger, the second generating step acting faster than the first generating step to changes in the temperature of the circulating fluid.

14. The method of claim 13 wherein the second error signal is only generated if an observation of the fluid temperature of the circulating fluid at a location fluidly prior to the primary heat exchanger determines that the fluid temperature is in a range indicating a likelihood of undesirably cool circulating fluid entering the primary heat exchanger.

15. The method of claim 13 wherein the boiler further includes a cold water bypass valve, the method further including observing the fluid temperature of the circulating fluid and generating a signal using the observed fluid temperature to control the coldwater bypass valve.

16. The method of claim 13 further comprising the step of determining whether the first error signal or the second error signal indicates a need to increase the boiler firing rate.

17. The method of claim 13 further comprising the step of selecting whichever of the first error signal or the second error signal indicates a greater need for an increase of the boiler firing rate.

18. The method of claim 17 wherein, if either the first error signal or the second error signal indicates a need to increase the boiler firing rate, the method further comprises increasing the boiler firing rate.

19. The method of claim 13 wherein the boiler is a high efficiency condensing boiler having a primary heat exchanger and a secondary heat exchanger, the secondary heat exchanger configured for exchanging heat from flue gasses produced in the primary heat exchanger with the circulating fluid.

20. The method of claim 19 wherein the step of measuring a fluid temperature for the circulating fluid includes measuring a bypass temperature defined as the circulating fluid temperature at the inlet to the primary heat exchanger, the method further comprising:

if the bypass temperature is below a defined threshold, measuring an inlet temperature of the circulating fluid at the inlet to the secondary heat exchanger, wherein the second error signal is generated using a proportional measurement of the inlet temperature and an integral measurement of the bypass temperature.

21. A controller for a boiler system having a memory containing an executable instruction set for performing the methods of claim 20.

22. A controller for a boiler system having a memory containing an executable instruction set for performing the methods of claim 13.

23. A method of controlling a high efficiency condensing boiler having an adjustable firing rate, a primary heat exchanger, and a secondary heat exchanger, the primary heat exchanger creating flue gasses used for heat exchange in the secondary heat exchanger to warm a circulating fluid passing through both the primary heat exchanger and the secondary heat exchanger before the fluid enters the primary heat exchanger, the method comprising:

observing a bypass temperature at a location fluidly adjacent the intake for the primary heat exchanger; and

if the bypass temperature is above a predefined threshold, operating the system in accordance with a first proportional/integral control method reliant primarily upon measurements of the bypass temperature;

otherwise, operating the system in accordance with a safety method using:

the first proportional/integral control method to generate a first error signal for indicating whether the firing rate of the boiler should be increased to prevent condensation in the primary heat exchanger; and

a second error generation method making use of signals both the measured bypass temperature and a measured inlet temperature taken from the circulating fluid at the intake to the secondary heat exchanger.

24. A controller for a boiler system having a memory containing an executable instruction set for performing the methods of claim 23.

25. A method of controlling a high efficiency condensing boiler having a primary heat exchanger and a secondary heat exchanger, the secondary heat exchanger configured for exchanging heat between flue gasses having a condensation temperature that are created by the boiler and a circulating fluid circulated in a predetermined direction by the boiler, the boiler configured to have a bypass sensor for sensing a bypass temperature of the circulating fluid at a location fluidly between the secondary and primary heat exchangers, and inlet sensor for sensing an inlet temperature of the circulating fluid at a location fluidly prior to the secondary heat exchanger; the method comprising:

observing whether the boiler bypass temperature is in a range where fast response to a change in cold water input may be needed; and, if so:

(a) observing the inlet temperature;

(b) comparing the inlet temperature to the condensation temperature to determine whether the inlet temperature indicates a likelihood of the circulating fluid entering the primary heat exchanger at an undesirably low temperature, and generating a first error value based on the current inlet temperature; and

(c) observing the bypass temperature to generate an integral error that accumulates with time when the bypass temperature is more than an allowed amount below a predefined bypass setpoint value that is larger than the condensation temperature;

combining the first error value and the integral error to create an output value; and

if the output value indicates a likelihood of the circulating fluid entering the primary heat exchanger at an undesirably low temperature, increasing a firing rate for the boiler.

26. A controller for a boiler system having a memory containing an executable instruction set for performing the methods of claim 25.

27. A boiler system comprising a high efficiency condensing boiler and a controller as defined in claim 26.